Antimony

CAS No. 7440-36-0

General Information

Elemental antimony is a silver-white metal. In nature, antimony can be found in ores or other minerals, usually combined with oxygen to form antimony oxide. Antimony is used in metal alloys, storage batteries, solder, sheet and pipe metal, bearings, castings, and pewter. Antimony oxide is used as a fire-retardant in textiles and plastics. It is also used in paints, ceramics, fireworks, enamels, and glass. One organic antimony compound is still used as an antiparasitic medication.

Antimony gets into the environment from natural sources and from industry. People are exposed to antimony primarily from food and to a lesser extent from drinking water and air. Workplace exposures occur as a result of breathing the air near industries such as smelters, coal-fired plants, and refuse incinerators that process or release antimony. Workplace standards for air exposure to antimony have been established (OSHA, ACGIH). Antimony is considered an animal carcinogen, but evidence of its carcinogenicity in people is inadequate (IARC). Information about external exposure (environmental levels) and health effects is available from the EPA IRIS Web site at http://www.epa.gov/iris and from ATSDR at http://www.atsdr.cdc.gov/toxprofiles.

Table 15. Antimony

Geometric mean and selected percentiles of urine concentrations (in µg/L) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 6 and older	.114 (.101-.128)	< LOD	.070 (.050-.080)	.120 (.100-.130)	.200 (.190-.220)	.310 (.290-.350)	.410 (.390-.460)	2465
Age group								
6-11 years	.149 (.125-.178)	< LOD	.120 (.090-.130)	.170 (.150-.200)	.240 (.220-.260)	.330 (.280-.390)	.400 (.320-.600)	340
12-19 years	.133 (.113-.158)	< LOD	.090 (.070-.110)	.150 (.130-.180)	.220 (.200-.250)	.340 (.260-.380)	.430 (.350-.500)	719
20 years and older	.107 (.095-.121)	< LOD	.060 (.050-.080)	.110 (.100-.130)	.190 (.170-.210)	.300 (.280-.340)	.410 (.390-.460)	1406
Gender								
Males	.123 (.108-.139)	< LOD	.080 (.060-.090)	.130 (.120-.140)	.220 (.200-.240)	.330 (.290-.370)	.440 (.390-.530)	1227
Females	.106 (.094-.120)	< LOD	.060 (.050-.080)	.110 (.100-.130)	.180 (.170-.210)	.290 (.260-.340)	.390 (.330-.440)	1238
Race/ethnicity								
Mexican Americans	.100 (.081-.124)	< LOD	.060 (<LOD-.080)	.110 (.090-.140)	.190 (.170-.220)	.280 (.240-.330)	.390 (.310-.490)	884
Non-Hispanic blacks	.165 (.142-.193)	< LOD	.110 (.090-.130)	.160 (.150-.190)	.250 (.220-.290)	.400 (.310-.470)	.490 (.400-.580)	568
Non-Hispanic whites	.112 (.099-.127)	< LOD	.060 (.050-.080)	.110 (.100-.130)	.200 (.180-.220)	.310 (.270-.340)	.390 (.350-.500)	822

< LOD means less than the limit of detection, which is 0.03 µg/L.

Interpreting Urine Antimony Levels Reported in the Tables

Urine antimony levels were measured in a subsample of NHANES participants aged 6 years and older. Subsamples were randomly selected within the specified age range to be a representative sample of the U.S. population. Measuring antimony at these levels in urine is possible because of advances in analytical chemistry. Finding a measurable amount of antimony in urine does not mean that the level of antimony causes an adverse health effect. Several investigations of airborne exposures to antimony in workers show urinary levels that are many times higher than those seen in Table 15, even when exposure levels were below workplace air standards (Kentner et al., 1995; Ludersdorf et al., 1987; Bailly et al., 1991). Kentner et al. proposed a urinary limit of 260 µg/gram creatinine for workplace air exposures equivalent to an air concentration of 500 $\mu g/m^3$ of antimony hydride. Previous studies reporting measurements on normal populations (Minoia et al.1990; Paschal et al., 1998) or compiled reference ranges (Hamilton et al., 1994) have found values slightly higher than those reported in Table 15, some of which may be due to methodologic differences, although population and exposure differences may exist. The variation of urinary antimony levels across this NHANES 1999-2000 subsample was narrow, possibly indicating limited opportunities for exposure.

Table 16. Antimony (creatinine adjusted)

Geometric mean and selected percentiles of urine concentrations (in µg/gram of creatinine) for the U.S. population aged 6 years and older, National Health and Nutrition Examination Survey, 1999-2000.

	Geometric mean (95% conf. interval)	Selected percentiles (95% confidence interval)						Sample size
		10th	25th	50th	75th	90th	95th	
Total, age 6 and older	.107 (.094-.122)	< LOD	.071 (.060-.083)	.111 (.098-.128)	.178 (.159-.201)	.265 (.233-.318)	.364 (.310-.437)	2465
Age group								
6-11 years	.163 (.128-.209)	< LOD	.109 (.081-.154)	.178 (.154-.200)	.241 (.196-.382)	.447 (.260-.765)	.741 (.303-1.30)	340
12-19 years	.100 (.083-.122)	< LOD	.074 (.059-.089)	.113 (.095-.132)	.171 (.143-.190)	.241 (.199-.310)	.310 (.231-.421)	719
20 years and older	.103 (.090-.117)	< LOD	.068 (.058-.081)	.106 (.093-.120)	.167 (.145-.195)	.250 (.225-.300)	.344 (.318-.398)	1406
Gender								
Males	.096 (.084-.109)	< LOD	.065 (.058-.076)	.104 (.092-.114)	.159 (.143-.175)	.221 (.203-.234)	.295 (.234-.382)	1227
Females	.119 (.102-.139)	< LOD	.077 (.063-.093)	.120 (.106-.143)	.205 (.172-.233)	.310 (.259-.357)	.425 (.325-.486)	1238
Race/ethnicity								
Mexican Americans	.093 (.077-.112)	< LOD	.070 (.045-.082)	.105 (.097-.118)	.156 (.138-.181)	.226 (.209-.273)	.289 (.269-.350)	884
Non-Hispanic blacks	.107 (.092-.125)	< LOD	.073 (.061-.085)	.110 (.096-.125)	.159 (.142-.183)	.233 (.194-.304)	.338 (.233-.425)	568
Non-Hispanic whites	.112 (.096-.131)	< LOD	.073 (.060-.089)	.113 (.099-.136)	.186 (.164-.213)	.274 (.233-.333)	.398 (.310-.459)	822

< LOD means less than the limit of detection (see previous table).

Geometric mean levels of the demographic groups were compared after adjustment for the covariates of race/ethnicity, age, gender, and urinary creatinine. Urinary antimony levels were slightly higher for children aged 6-11 years than for either the 12-19 year-old or 20 year-old and older age groups. Urinary antimony levels in females were slightly higher than in males. It is unknown whether differences between ages or genders represent differences in exposure, body-size relationships, or metabolism.

Whether antimony at the levels reported here is a cause for health concern is not yet known; more research is needed. These urine antimony data provide physicians with a reference range so that they can determine whether people have been exposed to higher levels of antimony than those found in the general population. These data will also help scientists plan and conduct research about exposure to antimony and health effects.